

Application No. 10/616,058  
Reply to Office Action dated December 15, 2004

### REMARKS

This amendment cancels all previous claims and adds new claims 39-47. Reconsideration of this application is requested.

New claims 39-47 are similar in nature to claims 28-38, which were originally considered by the Examiner in parent application serial no. 09/414,002, now abandoned. Claim 39 combines elements of claims 28, 35 and 36 of the '002 parent application and additionally requires that the second end of the riser be externally connected to the disengaging end. Support for the claims comes from the general description of the invention at pages 11-13 of the specification. In addition, further detail is set forth in Fig. 1, where the external connection of the riser reactor to the disengaging zone is shown as element 16. Accordingly, no new matter is presented by this amendment.

#### I. Drawings

The drawings were objected to for not showing a "regeneration medium, preferably a gas comprising oxygen 20" and for not having a description in the specification regarding element "10." It should be noted that the "regeneration medium, preferably a gas comprising oxygen" actually refers to element "30" not "20," and that element "30" is shown in Fig. 1. Therefore, the objection in regard to this is in error.

The description of element "10" generally comes from the first sentence of the paragraph in the specification beginning at page 11, line 9. This sentence has now been amended to specifically denote the relevant description of element 10. Removal of the objections to the drawings are therefore requested.

#### II. Specification

The specification was objected to in the current office action for not sufficiently detailing cross-reference information to related applications. This amendment includes the additionally requested details. Accordingly, removal of the objection is requested.

Application No. 10/616,058  
Reply to Office Action dated December 15, 2004

III. Rejection of Claims Over the Prior Art

The previous claims of this application were rejected over U.S. Patent No. 4,451,313 (Wegerer) and U.S. Patent No. 5,302,280 (Lomas). Reconsidering of this application is requested in light of the amended claims.

This invention is directed to a reactor system that includes, *inter alia*, a riser reactor, a disengaging zone, and a regenerator. The riser reactor has a first end and a second end. The first end includes a feed inlet, and the second end has a diameter greater than that of the first end to impart a superficial gas velocity of 1-20 m/sec. The second end is also externally connected to the disengaging zone.

According to the invention, having a riser arrangement in which the second end has a diameter greater than that of the first end means that gas superficial velocity can be increased, and that catalyst density can be decreased, as catalyst flows up the riser reactor. The result is that backmixing of catalyst, feed and product can be effectively controlled so as not to overreact with product and thereby minimize undesirable side reactions. An advantage of having the riser externally connect to the disengaging zone is that a longer riser can be used to increase reaction time, while not adding undue length to the overall reactor and disengaging configuration.

Wegerer discloses a reactor system having a riser reactor having a first and second end, a disengaging zone and regenerator. The Wegerer system differs from applicants' claimed invention that the second end of the riser reactor has a narrower diameter than the first end, rather than a larger one. With this type of addition, catalyst density increases and gas superficial velocity decreases as catalyst travels up through the riser.

In addition, the riser of the Wegerer system differs from the claimed invention in that the Wegerer riser is internal to the disengaging zone rather than external as in the claimed invention. This internal connection of riser and disengaging zone either limits the separation ability of the cyclone system or undesirably increases the overall size of the disengaging zone, since there is limited room for cyclone and riser within the disengaging zone,. Wegerer, therefore, significantly differs from applicants' claimed invention.

Lomas discloses a reactor system of a type similar to Wegerer, except that Lomas uses a riser reactor that has a second end that is larger in diameter than the first end. However, like

Application No. 10/616,058  
Reply to Office Action dated December 15, 2004

Wegerer, the Lomas "riser discharges *into* an upper portion of a reactor vessel that functions as an open *disengagement zone*. . ." Column 6, lines 15-17, emphasis added. Thus, Lomas also differs from the claimed invention in that the Lomas riser is internal to the disengaging zone.

The only part external to the disengaging zone in the Lomas system is the cyclone separators. These separators are set up externally with the result that a dense catalyst bed is maintained in the top part of the reactor and the height of the dense bed is increased. See column 6, lines 21-30.

Although increasing catalyst dense bed height can be of benefit in certain systems, it can also be a drawback in systems in which limited back mixing of product and catalyst is desired. In particular, the Lomas system can cause over reaction of product within the reactor, since the dense bed can be highly reactive to product as well as feed and a substantial amount of catalyst in the dense bed stays in contact with product in the disengaging zone. Thus, in systems in which limited back mixing is desired, a dilute catalyst phase is actually preferred over dense beds.

This invention overcomes the over reaction problem of the Lomas system by externally connecting the riser to the disengaging zone in order to increase the length of the dilute catalyst phase, thereby decreasing the dense bed height. This also provides additional benefits in that less catalyst can be used and overall system height can be shortened. This invention, therefore, teaches away from Lomas. Thus, neither Lomas nor the combination of Lomas with Wegerer suggests applicants' claimed invention.

#### IV. Conclusion

Having demonstrated that the cited references, taken either alone or in combination, fail to disclose or suggest the invention as claimed, this application is in condition for allowance. Accordingly, applicants request early and favorable reconsideration in the form of a Notice of Allowance.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated, since this should expedite the prosecution of the application for all concerned.

Application No. 10/616,058  
Reply to Office Action dated December 15, 2004

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response. Please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1712 (Docket #: 1997B049/4).

Respectfully submitted,

8 March 2005  
Date

  
Frank Reid  
Attorney for Applicants  
Registration No. 37,918

ExxonMobil Chemical Co.  
Law Technology Department  
P.O. Box 2149  
Baytown, Texas 77522-2149  
Phone: 281-834-1743 (Voice)  
Fax: 281-834-2495